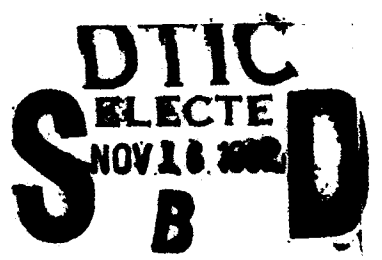
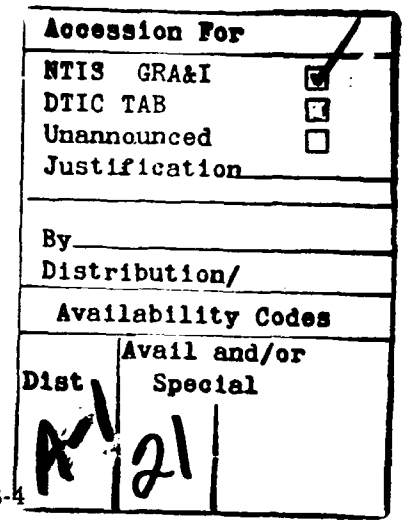
Drug Prevention in Junior High

A Multi-Site Longitudinal Test

Phyllis L. Ellickson, Robert M. Bell



The research described in this report was supported by a grant from the Conrad N. Hilton Foundation.



ISBN: 0-8330-1048-4

Published by The RAND Corporation
1700 Main Street, P.O. Box 2138, Santa Monica, CA 90406-2138

R-3919-CHF

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March 1990

Supported by the
Conrad N. Hilton Foundation

RAND

Drug Prevention in Junior High: A Multi-Site Longitudinal Test

PHYLLIS L. ELLICKSON AND ROBERT M. BELL

Results from a longitudinal experiment to curb drug use during junior high indicate that education programs based on a social-influence model can prevent or reduce young adolescents' use of cigarettes and marijuana. This multi-site experiment involved the entire seventh-grade cohort of 30 junior high schools drawn from eight urban, suburban, and rural communities in California and Oregon. Implemented between 1984 and 1986, the curriculum's impact was assessed at 3-, 12-, and 15-month follow-ups. The program, which had positive results for both low- and high-risk students, was equally successful in schools with high and low minority enrollment. However, the program did not help previously confirmed smokers and its effects on adolescent drinking were short-lived.

ALTHOUGH CONCERN ABOUT ADOLESCENT DRUG USE HAS grown over the past two decades, strategies for controlling use have not kept pace (*1*). Early models of drug prevention failed to make appreciable inroads against the problem (*2, 3*). More recent approaches have been widely touted but rarely tested rigorously. Consequently, parents, schools, and community groups lack solid guidance about what "works" to keep young people from getting involved with drugs.

We describe the results of Project ALERT, a multi-site, longitudinal test of a school-based prevention program for seventh and eighth graders. The curriculum specifically targets cigarettes, alcohol, and marijuana, the so-called gateway drugs, which are the most widely used by young people and typically precede initiation of harder drugs (*4, 5*). Use of these substances by adolescents merits public concern because each poses substantial and specific harm to their health, development, or safety. Moreover, the earlier people start using them, the longer they risk adverse effects.

Project ALERT is based on the social influence model of prevention, which has shown promise for preventing or reducing adolescent smoking (*6*). The curriculum seeks to curb adolescent drug use by motivating young people to resist drugs and helping them acquire the skills to do so. This approach differs sharply from the failed drug prevention models of the 1960s and 1970s, which were information and general skills programs. The former typically emphasized the long-term consequences of using drugs, often exaggerating their harmful effects (*7*). The latter rarely linked general skills in communication or decision making with specific situations involving drugs (*8*). In contrast, the social influence approach tries to help young people understand how drugs can affect them now, in their daily lives and social relationships (*9*). Recognizing that knowledge alone rarely changes behavior (*1*), the model also helps them identify pro-drug pressures and acquire a repertoire of strategies for resisting those pressures.

Our study was designed specifically to overcome problems that raised questions about how generalizable and credible earlier school-based studies have been. Most other evaluations have not included schools with substantial minority populations (*10*). Many have also suffered from lack of random assignment, faulty implementation, and failure to assess attrition or the accuracy of self-reported drug use measures (*2, 11*). Even a recent large-scale study could not use randomized assignment or case controls (*12*). Moreover, studies providing student-level results have typically failed to adjust for within-school correlation of outcomes, which makes tests of significance overly liberal (*13*). When school has been the unit of analysis, the estimates have not adequately accounted for differences in individual student characteristics that could explain program effects. In the following sections, we describe how we addressed each of these challenges to research integrity.

Experimental Design and Hypotheses

We recruited 30 schools that represent a broad spectrum of communities, socioeconomic status, and racial and ethnic composition. Drawn from eight school districts in the northern and southern regions of California and Oregon, they cover urban, suburban, and rural settings. Nine have a minority population of 50% or more and 18 draw from neighborhoods with household incomes below their state median.

The 30 schools were randomly assigned to one of three experimental conditions. The ten control schools, which did not receive the Project ALERT curriculum, were allowed to continue any traditional drug information programs they might have, and four did so. In the 20 treatment schools, enrolled seventh graders received an eight-session curriculum plus three booster lessons when they reached the eighth grade. An adult health educator taught the seventh-grade program in ten of these schools; teen leaders from neighboring high schools assisted the adult teachers in the other ten schools. This variation allowed us to test whether the curriculum was more effective when older teens were involved than when it was taught solely by adults. All 30 schools refrained from actions that might have contaminated the experiment, and none dropped out.

To reduce differences in student characteristics among experimental conditions, we used three methods: blocking by district, restricted assignment, and randomized assignment of schools. In districts with only three schools, for example, exactly one school could be assigned to each condition. We restricted assignments to a subset that produced relatively little imbalance among experimental conditions in characteristics such as school test scores, language spoken at home, drug use among the schools' eighth graders, and the ethnic

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Reprinted from *Science*, Volume 247, 16 March 1990, pages 1299-1305.

and income composition of school catchment areas. We then randomly selected from among the eligible assignments, giving each school a one-third probability of assignment to any particular condition. These procedures produced substantial pretreatment equivalence across experimental conditions in school-level characteristics potentially related to future drug use (*14*).

Our hypotheses about the program's effects derived from prior research on drug use patterns, antecedents, and prevention. We had four expectations: First, the program would be more effective against cigarettes and marijuana than against alcohol. Drinking is the most prevalent and socially acceptable form of substance use among both young people and adults, while substantially fewer Americans use cigarettes or marijuana or approve of doing so (*4, 15*). Successful prevention may require a threshold level of societal disapproval (*3*). Second, the program would have a stronger impact on nonusers and experimenters than on users. Adolescent users typically have more stable, and thus more resistant, motivations to use drugs than nonusers and experimenters (*16*).

Third, program effects would be reinforced or strengthened after delivery of the eighth-grade booster curriculum. Fourth, the program would be more successful when teen leaders were included in curriculum delivery. Some evaluations have reported better results when (i) young people are included in classroom delivery or (ii) the curriculum has a booster component (*17*).

Curriculum Content and Implementation

The Project ALERT curriculum builds on and extends the social influence model underlying recent smoking prevention programs (*9, 10, 18*). It aims to help students develop reasons not to use drugs, identify pressures to use them, counter pro-drug messages, learn how to say no to external and internal pressures, understand that most people do not use drugs, and recognize the benefits of resistance. The seventh-grade curriculum consists of eight lessons, taught a week apart. The three eighth-grade lessons reinforce the seventh-grade program.

Features that distinguish Project ALERT from earlier anti-smoking programs include its attention to the beliefs and circumstances that promote use of alcohol and marijuana, its focus on "pressures from inside yourself" (as well as external pressures to use drugs), and its clearly articulated theoretical underpinnings, drawn from the health belief model (*19*) and the self-efficacy theory of behavior change (*20*). The highly participatory curriculum makes extensive use of question and answer techniques, small group exercises, role modeling, and repeated skills practice. These methods allow teachers to adjust program content to diverse classrooms with different levels of information and drug exposure.

During the 2-year delivery period, 58 health educators and 75 teen leaders taught Project ALERT in the 20 treatment schools. To assess the fidelity of curriculum delivery, 17 monitors observed 950 of the 2300 lessons taught. Classroom logs and the monitor reports indicate that the curriculum was implemented and delivered as intended. Every scheduled class was presented and, in 92% of the observed classes, all lesson activities were covered.

Data Collection Procedures and Validity of Reported Use

Trained data collectors administered questionnaires in the classroom at four points during the program's first 2 years: before and after delivery of the seventh-grade curriculum (baseline and 3-month follow-up) and before and after delivery of the eighth-grade booster curriculum (12- and 15-month follow-ups). These questionnaires solicited information on whether, how often, and how much students had used alcohol, cigarettes, and marijuana, and on psychosocial variables related to drug use.

Few students refused to fill out the surveys (<1%) and, because the largest group of nonrespondents closely resembled respondents, nonresponse at baseline had little effect on sample characteristics or before treatment equivalence (*21*). Total baseline nonresponse amounted to 14%, mostly attributable to parent refusals of informed consent (9%) and absence (3%).

Because the validity of self-reports is often questioned in studies of "disapproved" behavior, we used several methods to reduce incentives for distorting or concealing substance use. The data collectors followed a strict protocol that described study measures for protecting data privacy, explained that each student had the right to refuse to participate, and stressed the importance of telling the truth. As a further motivation to tell the truth, we collected a saliva sample from each student immediately before administering the survey, informing them that the samples would be tested. This procedure has been found to improve the accuracy of reported cigarette use among adolescents (*22*). To get an objective measure of the validity of reported tobacco use, we tested the specimens for cotinine (*23*).

The students appear to have told the truth. At baseline and 15 months later, 95% of students with cotinine scores that identified them as recent tobacco users ($n = 603$) reported use of cigarettes or chewing tobacco in the past month (*24*). Data on inconsistencies in student self-reports suggest that few students deliberately lied about alcohol and marijuana as well. Data from all four surveys showed the proportion of students who denied using a target substance after previously admitting use averaged about 5%, a slightly lower rate than that found in earlier research (*25*). Retractions of frequent use averaged substantially less than 1%. In addition, we found no evidence that those in the treatment schools reacted to the experiment by distorting their reports (*14*).

Analysis Sample and Methods

To ensure that differences in outcomes before and after booster lessons could not be attributed to different samples, we restricted the analysis to students who were enrolled during grades 7 and 8 and were thus eligible to receive the full 2-year curriculum. Students in the analysis sample also had to supply data on the baseline control variables and the relevant outcome variables at the three follow-up surveys. The analysis sample constitutes 60% of the baseline sample of 6527 students. Of the missing 40%, 18% moved after baseline and 22% were absent or failed to supply the relevant data at one or more of the surveys.

Students omitted from the analysis were significantly more likely to have before-treatment characteristics often cited as risk factors for drug use (for example, low grades, family disruption, and early drug use). Nevertheless, the change in composition between the baseline and analysis samples averaged only about five percentage points, with the largest gap for the percentage who had tried marijuana (Table 1).

We used logistic regression at the student level to analyze a series of binary outcome measures for each target substance as a function of treatment and baseline covariates. To determine whether the curriculum's effectiveness differed for nonusers and experimenters compared to users, we divided the students into three risk levels for each substance. For cigarettes and alcohol, the levels were nonusers (never), experimenters (ever, but fewer than three times in the year before baseline and not in the month before baseline), and users

(three or more times in the past year or any use in the past month). Because students who had not tried marijuana constitute a large and heterogeneous group, we subdivided them into two risk groups: those who had not smoked cigarettes by grade 7 and those who had. The third level includes all students who had already tried marijuana.

We found no evidence that either attrition rates or which students were lost from the analysis varied across experimental conditions. However, analysis of baseline characteristics uncovered differences among the experimental groups in the expected amount of substance use that would have occurred without any intervention. Using baseline data only, we calculated propensity-to-use scores that predict the probability of current use 15 months after baseline. In four of nine cases (three risk groups per substance), the mean propensity was highest in the control group, although only one comparison was significant. Although these differences were small, failure to control for them would tend to favor the treatment groups. The results have been adjusted to eliminate these differences and may be interpreted as if the control and the two treatment groups were identical at baseline.

Table 1. Student characteristics in baseline and analysis samples. Differences are statistically significant with $P < 0.001$, except for percentage Hispanic ($P = 0.01$).

Baseline (before intervention) characteristic	Baseline sample* (% of 6527)	Analysis sample† (% of 3852)
Male	52	49
White	67	71
Hispanic	10	9
Black	10	8
Asian	8	10
Indian/mixed	5	3
Low grades (C or lower)	30	25
Father not a high school graduate	24	20
Not living with both natural parents	39	33
Ever used cigarettes	54	48
Ever used alcohol	77	75
Ever used marijuana	21	14

*Students who filled out surveys before program implementation. †Students who supplied relevant data at all four data collection points.

Covariates common to all the logistic regression models included district, dummy variables for black and Asian (both tended to predict lower use), and a composite variable that equally weighted 64 baseline items. The latter covered peer and family use of and attitudes about the target substances, personal beliefs about them, and several background variables. For each specific substance, we also included intentions to use, offers, and a substance-specific scale of other items. Baseline use of the target substance and the other substances were included when there was sufficient variation within that risk level.

When outcomes are correlated within school, standard-error estimates for school-level variables, such as treatment, are too small and significance tests are inaccurate. Following Kish (*13*), we estimated the size of the within-school correlations in order to compute factors for multiplying standard errors and dividing t statistics associated with treatment effects. Our analysis indicated that the outcomes shared a common within-school correlation, which was reduced to 0.0032 by controls for baseline use, district, and other covariates. Hence, the appropriate adjustment factors were small, ranging from 1.04 to 1.11.

Although we estimated results with both the student and the school as the unit of analysis, we present the student analysis for two reasons. First, because the most important predictors of drug use are individual characteristics, student analysis facilitates more precise controls for preprogram differences among the treatment groups

Table 2. Program effects on alcohol use. Where values are omitted, overall use was <2.5% or otherwise not applicable.

Alcohol use in experimental groups	After intervention drinking rates among baseline: Nonusers (% of 953) at month			Alcohol experimenters (% of 1795) at month			Alcohol users (% of 1130) at month		
	3	12	15	3	12	15	3	12	15
Ever									
Teen leader	16.3**	47.4	57.2						
Health educator	18.0	45.5	53.7						
Control	22.8	50.0	57.8						
In past month									
Teen leader	5.9**	14.4	22.0	20.9	37.9**	44.2	69.6	73.0	77.0
Health educator	8.0	10.5	18.8	22.3	33.0	42.1	62.7*	70.7	74.4
Control	10.8	14.6	19.8	25.1	31.1	45.1	69.5	71.6	76.5
Monthly†									
Teen leader				3.4*	15.1	19.0	37.9	49.3	50.3
Health educator				5.6	13.8	17.6	33.3	45.5	46.7
Control				6.0	12.8	20.0	38.1	49.0	50.2
Weekly (6+ days in past month)									
Teen leader					2.4	4.1	8.0	13.4	15.2
Health educator					2.2	3.6	6.4	10.7	13.6
Control					3.8	3.0	7.0	11.7	15.3
Quit (no use in past year)									
Teen leader					32.8	32.0		6.2	5.3
Health educator					35.0	28.8		4.5	5.4
Control					33.7	29.9		5.9	6.2

*$P < 0.10$, compared to control. **$P < 0.05$, compared to control. †Eleven or more times in the past year or three or more days in the past month.

(*26*). Second, the student-level adjustments for within-school correlation produced more stable standard errors. School-level standard errors were less stable and frequently smaller (by as much as 36%) than those obtained from unadjusted or adjusted student-level analyses, thereby producing statistical significance when the student analysis did not. Both methods support similar conclusions, but the school-level method tended to favor the program.

We use two-tailed tests of significance because one-tailed tests, which would yield more favorable *P* values, require an expectation of positive results. Given the frequent findings of boomerang effects in prevention research, that expectation is not warranted (*27, 28*).

Program Effects

Alcohol use. Shortly after delivery of the seventh-grade curriculum, Project ALERT produced modest reductions in drinking for all three risk levels: nonusers, experimenters, and users (Table 2). Among baseline nondrinkers, the curriculum reduced the number who initiated alcohol use in the subsequent 3 months by 28% ($P = 0.04$) and cut current drinking (use in the past month) by almost one-half ($P = 0.02$). For experimenters, it produced a reduction in monthly use of 44% ($P = 0.07$). Even among users, the curriculum held down current drinking 3 months later ($P = 0.06$). These results were largely attributable to the teen leader curriculum. Although students taught solely by adults also exhibited lower use patterns than control students, the only significant seventh-grade difference was for baseline users.

After the students entered the eighth grade, however, most of these early gains disappeared. Between grades 7 and 8, student exposure to alcohol greatly increased. For example, half of the control students with no prior drinking experience at baseline initiated alcohol use within 12 months. Participation in the seventh-grade curriculum did not slow down this acceleration. Nor did the booster curriculum revive the program's earlier success.

Cigarette use. Contrary to our expectations, Project ALERT had little effect on baseline nonusers (those who had not tried cigarettes by the time they were in the seventh grade) (Table 3). In contrast, the curriculum produced significant reductions across all subsequent smoking levels for baseline experimenters. It also stimulated some to quit.

These favorable results typically did not show up until the students had received the three booster lessons. However, for experimenters in the health educator group, a moderate increase in quitting (no smoking for at least 1 year) emerged at 12 months, before exposure to the booster lessons ($P = 0.03$). The quitting effect increased slightly after booster program delivery ($P = 0.006$), also showing up for students in the teen leader schools ($P = 0.09$). In addition, current smoking among baseline experimenters declined after the booster program—by 17% in the teen leader schools ($P = 0.08$) and by 27% in the health educator schools ($P = 0.007$). More frequent smoking (monthly use) decreased by over one-fourth in the teen leader schools ($P = 0.03$).

Project ALERT also reduced levels of cigarette use that signal serious use, especially for baseline experimenters in the teen leader schools. After delivery of the eighth-grade booster lessons, weekly smoking declined by almost 50% in the teen leader schools ($P = 0.006$) and by one-third in the adult only group ($P = 0.09$). Daily use, which is highly likely to signify addiction among adoles-

Table 3. Program effects on cigarette use. Where values are omitted, overall use was <2.5% or otherwise not applicable.

Cigarette use in experimental groups	After intervention smoking rates among baseline								
	Nonusers (% of 1990) at month			Cigarette experimenters (% of 1202) at month			Cigarette users (% of 660) at month		
	3	12	15	3	12	15	3	12	15
Ever									
Teen leader	6.8	23.4	28.9						
Health educator	7.8	24.1	30.6						
Control	6.5	25.8	31.1						
In past month									
Teen leader	3.0	6.0	7.1	12.7	25.7	26.8*	51.8	58.5*	63.2***
Health educator	4.3*	7.1	9.4	13.9	23.2	23.6***	55.3	55.6	56.1
Control	2.3	8.3	8.4	15.6	26.1	32.3	52.8	48.9	48.9
Monthly†									
Teen leader				6.4	15.5	16.5**	43.1	57.4***	54.0**
Health educator				6.9	17.9	18.9	40.8	51.7*	48.8
Control				6.8	19.3	22.4	47.8	42.9	43.4
Weekly (6+ days in past month)									
Teen leader					6.0	5.7***	18.4	34.1	34.6*
Health educator					7.9	7.4*	21.0	25.8	27.4
Control					6.5	11.1	18.7	27.5	26.4
Daily (20+ days in past month)									
Teen leader					3.1	2.3**	7.8	17.1	19.0
Health educator					2.7	4.5	12.9**	15.9	18.2
Control					2.6	5.1	6.6	18.1	15.9
Quit (no use in past year)									
Teen leader					50.2	50.3*		15.1	18.6
Health educator					55.2**	54.6***		11.9	15.7
Control					47.0	44.2		15.9	18.7

*$P < 0.10$, compared to control **$P < 0.05$, compared to control ***$P < 0.01$, compared to control †Eleven or more times in the past year or three or more days in the past month

cents, dropped by over 50% among students in the teen leader program ($P = 0.03$).

For baseline smokers, however, Project ALERT produced negative results. Paradoxically, these boomerang effects were stronger for students in the teen leader schools. At 12 months, current smoking for baseline users had increased by 20% in these schools ($P = 0.052$), growing to almost 30% after exposure to the booster program ($P = 0.004$). Monthly and weekly use followed a similar pattern: the former was one-third higher in the teen leader schools at 12 months ($P = 0.002$), dropping only slightly after the booster program ($P = 0.02$); the latter was also higher in these schools, but significantly so only at 15 months ($P = 0.06$).

Marijuana use. Project ALERT's most consistent results, across both groups and time, were for marijuana. For students who had not tried marijuana or cigarettes at baseline, it curbed initiation by one-third and reduced current use by 50 to 60% (Table 4). Project ALERT also held down more frequent (monthly) use among those who had already started smoking cigarettes, students who were three times as likely to try marijuana within a year as the baseline nonsmokers. These effects appeared 9 months after completion of the seventh-grade program and were maintained after the booster lessons.

The most substantial results occurred for students who had never used marijuana or cigarettes. About 8% of the control school students began using marijuana within a year and 12% had begun using by 15 months. In both treatment groups, however, the initiation rate was reduced by about one-third—even before they received the eighth-grade lessons ($P = 0.07$ for teen leader schools; $P = 0.03$ for health educator schools). The booster program appeared to maintain those results, keeping the reduction in the treatment schools close to one-third ($P = 0.02$ for both groups).

Project ALERT also curbed current use for this lowest risk group. Students in the schools where lessons were taught only by an adult were almost 50% less likely to have become current users by grade 8 ($P = 0.09$). That effect increased to over 60% after exposure to the booster program ($P = 0.01$). Fewer students had become current marijuana users in the teen leader schools as well, but the differences were not statistically significant.

Project ALERT's effect on students in the two higher risk groups showed a consistent pattern of reductions, but the effects were smaller and less often statistically significant. Among those who had not tried marijuana but had tried cigarettes, the program produced a 50% reduction in monthly marijuana use at 12 months ($P = 0.04$). For those who had tried marijuana at baseline, the pattern was most pronounced in the teen leader schools, where the proportion of weekly marijuana users was about half that in the control schools shortly after delivery of the seventh-grade program ($P = 0.05$). At 12 months, however, that reduction had almost disappeared. After the booster program, the effect on weekly use was partially reinstated, but the 25% difference, although significant (and larger) in the school-level analysis, was not significant at the individual level.

Discussion

These results indicate that the social influence model of prevention, as implemented in Project ALERT, works. In both treatment groups, students who had not tried marijuana or cigarettes before baseline had substantially lower rates of initiation and current marijuana use than the control group. Among those who had experimented with cigarettes at baseline, the treatment groups smoked significantly less at several levels: from occasional to serious use.

The findings counter two criticisms frequently leveled at prevention programs—that they work only for children who are the least likely to become confirmed users and that they prevent trivial levels of use. In fact, Project ALERT was very effective with high-risk tobacco experimenters, who were four times as likely as baseline

Table 4. Program effects on marijuana use. Where values are omitted, overall use was <2.5% or otherwise not applicable.

Marijuana use in experimental groups	After intervention marijuana use rates among baseline								
	Marijuana and cigarette nonusers (% of 1976) at month			Marijuana nonusers, cigarette users (% of 1344) at month			Marijuana users (% of 554) at month		
	3	12	15	3	12	15	3	12	15
Ever									
Teen leader		5.2*	8.3**	4.7	26.0	31.9			
Health educator		4.9**	8.3**	7.4	24.1	31.0			
Control		7.7	12.1	6.4	23.1	28.1			
In past month									
Teen leader		2.1	2.9	2.5	9.4	11.1	28.5	36.7	37.6
Health educator		1.6*	1.4***	2.3	8.3	10.1	24.1	45.9	39.1
Control		3.2	3.7	2.8	11.4	13.6	29.0	43.8	43.8
Monthly†									
Teen leader					5.9	7.2	19.3	29.4	29.3
Health educator					3.3**	4.6	19.2	33.8	32.6
Control					6.4	6.4	19.5	33.1	32.5
Weekly (6+ days in past month)									
Teen leader							5.6**	13.8	10.4
Health educator							10.8	15.6	12.9
Control							10.7	16.0	14.2
Quit (no use in past year)									
Teen leader								38.9	37.4
Health educator								29.2	34.1
Control								32.5	32.5

*$P < 0.10$, compared to control **$P < 0.05$, compared to control ***$P < 0.01$, compared to control †Eleven or more times in the past year or three or more days in the past month

Table 5. Characteristics of baseline nonsmokers, experimenters, and users.

Baseline (before intervention) characteristic	Baseline level of cigarette use		
	Nonusers (% of 1990)	Experimenters (% of 1202)	Users (% of 660)
Beliefs about cigarettes			
Intend to use in future	1	6	54
Not harmful	9	17	28
Relaxes you	8	12	44
Smoking environment			
Best friend smokes sometimes	8	22	65
Around peers who are smoking	8	25	70
Other problems			
Parents divorced, do not live together	26	41	46
Trouble communicating with parents	28	42	57
Stolen from store	9	23	42
Skipped school	8	15	34
Grades of C or lower	16	30	40

nonusers to become current or monthly smokers by 15 months. It also curbed smoking at levels that suggest addiction among these young adolescents.

Alcohol, however, appears to pose a different and more difficult problem. Although Project ALERT produced modest, but significant, reductions in drinking levels among all three risk groups during grade 7, it did not sustain that effect. We think this erosion occurred because the widespread prevalence of alcohol use, in society at large, as well as in the schools that participated in our experiment, undermined curriculum messages about resisting pressures to drink.

Drinking is an integral part of American social life, whereas smoking and marijuana use are considerably less common and less accepted. Among high school seniors, two-thirds report current drinking while less than 30% report smoking or using marijuana. Similarly, over 55% disapprove of trying marijuana once or twice; only 21% disapprove of trying one or two drinks (*4*). The implication is that sustained reductions in teenage drinking are unlikely without substantial changes in society's attitudes toward alcohol and its use.

Our findings suggest that booster lessons are important for maintaining and strengthening early program results. Although it did not reinstate early program gains for alcohol, the eighth-grade booster curriculum appeared to provide the reinforcement needed for the emergence of significant smoking reductions and to prevent the erosion of seventh-grade program effects for marijuana. During the junior and senior high years, adolescents are exposed to more diverse peer networks and increased drug use among their friends and acquaintances. Providing additional lessons as they pass through this vulnerable stage may help solidify early prevention gains.

Contrary to our expectations, the findings yield no clear recommendation for using older teens in the classroom. Neither method of curriculum delivery showed a dominant pattern across all three substances. In tests for significant differences between the two treatment groups, neither stood out as superior.

The results also suggest that early cigarette smokers need a more aggressive program than that offered by the social influence model alone. Project ALERT not only failed to reduce smoking among the baseline users, but actually increased it in the teen leader schools—a boomerang effect found in other antismoking programs (*2, 28*). For these more confirmed smokers, being told that most of their peers do not smoke and exposing them to nonsmoking teens appears to be irrelevant at best and counterproductive at worst.

The data in Table 5 suggest why this may be so. By the seventh grade, pro-smoking attitudes were substantially more prevalent in this group than among the baseline nonusers and experimenters. Further, considerably more baseline smokers had been exposed to smoking models and pressures, particularly from their peers. Asking them to resist those pressures meant asking them to reject the values, and perhaps the company, of their chosen reference group. In retrospect, it is not surprising that few of them heeded the message.

The program might be more effective with these early smokers if it gave them specific lessons on quitting and fostered positive interactions with nonsmoking peers. However, as Table 5 indicates, early smoking is just one in a constellation of problems these children exhibit. Compared with the two other groups, they were more likely to do poorly in school, to engage in other deviant behavior, and to have impaired or disrupted family relations. Effectively addressing their multiple problems requires intensive intervention at an earlier age: programs that target additional resources to these troubled children and their families during the elementary school years.

Our results have added significance because they apply to a wide variety of school environments in California and Oregon: those with and without substantial minority populations, those drawing from neighborhoods at the lower and higher ends of the socioeconomic spectrum, and those in urban, suburban, and rural settings. To test whether program effects were restricted to schools in a white, middle-class environment, we subdivided our sample into two groups: (i) three districts (13 schools) with high minority populations (at least 30% nonwhite enrollment in each school); and (ii) the remaining five districts (with typically 90% or more white enrollment in each school). Treatment effects were similar for both groups, and where they differed, the program generally had better effects in the high minority schools.

Project ALERT's effects indicate that school-based programs have important potential for decreasing substance use among young people. Such a decrease has positive implications for adolescent development and safety and for public health in general. Marijuana use can impair memory, distort perception, and diminish motor skills (*29*), thereby interfering with the young person's ability to learn and increasing the likelihood of driving and other accidents. The earlier people begin to smoke, the harder it is to stop and the greater the risk of illness related to tobacco use (*30*). Moreover, drug use initiation before age 15 increases the risk of dysfunctional use or abuse in later years (*31*), whereas curbing cigarette and marijuana use, particularly the latter, offers the prospect of preventing or delaying progression to other dangerous drugs (*5*). Thus, each year that adolescent use of these gateway substances can be delayed or reduced represents an important gain.

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32. Supported by a grant from the Conrad N. Hilton Foundation. P. Ellickson is a senior behavioral scientist and R. Bell is a statistician at the RAND Corporation. We are indebted to the school personnel, students, and staff members who contributed to this study and to J. Newhouse, J. Peterson, and the anonymous reviewers who provided valuable comments on earlier drafts.